
**Joint Technology Exchange Group**
**United States Coast Guard, Elizabeth City, NC**

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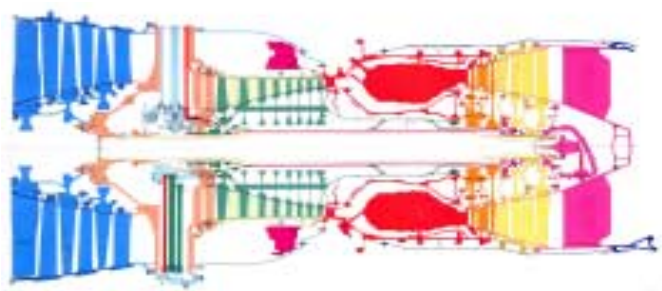
REPTECH

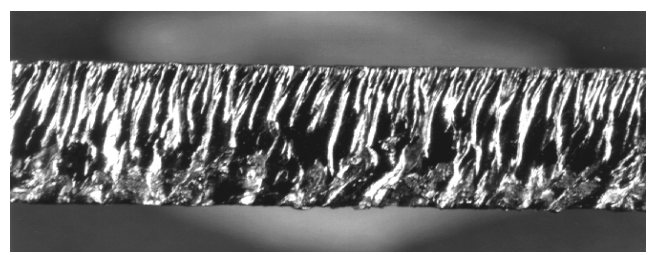
## Outline of Presentation

- Purpose of Visit to JTEG
- ARL Background
- ONR - MANTECH “Center of Excellence”
- Repair Technologies (REPTECH)
  - › Scope
  - › Process
  - › Provides
  - › Projects
- REPTECH Recent improvements
- Summary

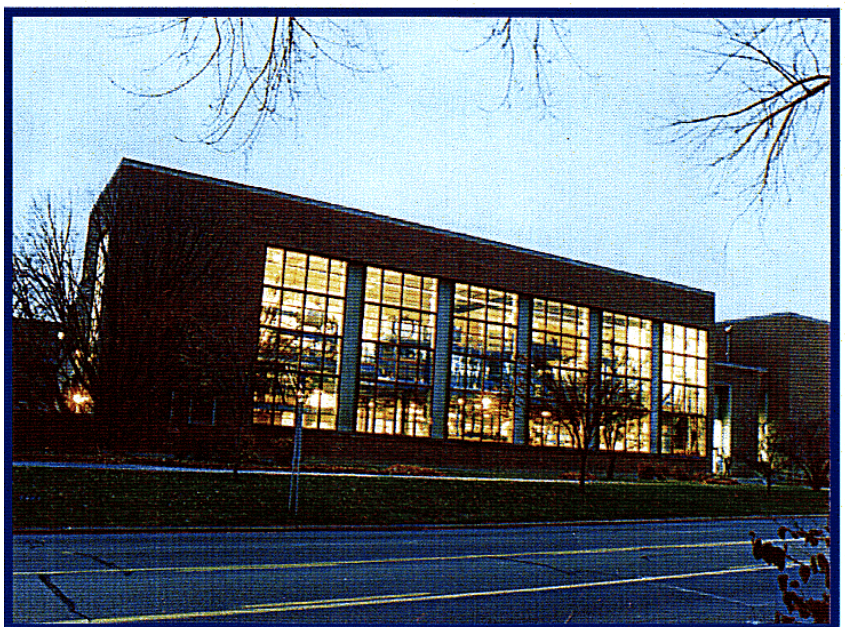
## Purpose of Visit

- Introduce ARL & REPTECH - The Navy's Repair Technology program
- Present a sample of current REPTECH projects for discussion
  - Torpedo Repair (NAVSEA)
  - VLS Tube Repair (NAVSEA)
- Discuss the Peaks & Valleys of the Navy's Repair Technology Program...



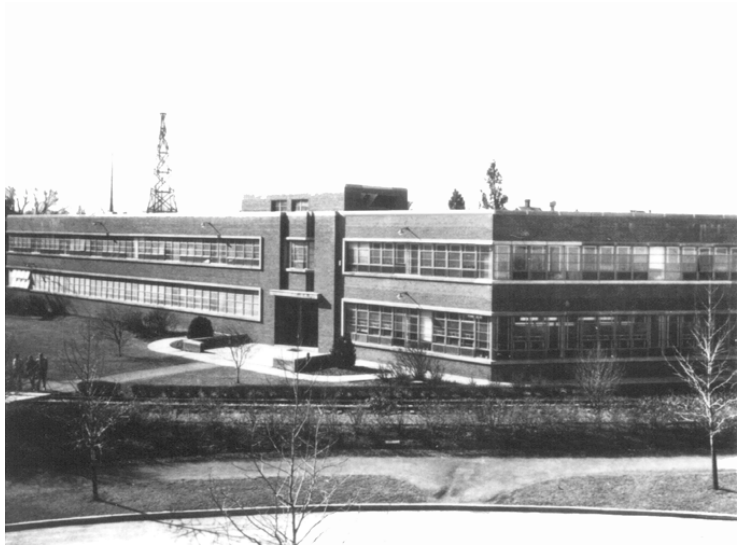


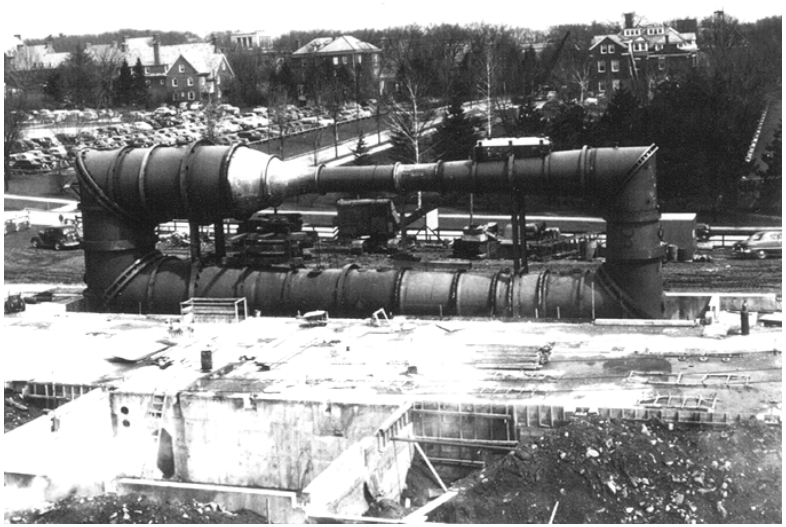
# Applied Research Laboratory



PENNSTATE ARL

# ARL Background





- **U.S. Navy established the Applied Research Laboratory at Penn State in 1945**
- **Eric Walker, first Director (1945-51), and Dean of Engineering (1951-56), and PSU President (1956-70)**
- **Garfield Thomas Water Tunnel was completed in 1949 and has served as the Navy's principal hydrodynamic facility for torpedoes**
- **The Intercollege Graduate Degree Program in Acoustics was established in 1965**
- **U.S. Navy has been the Laboratory's major sponsor (75-95%) since its establishment**

PENNSTATE ARL

# Organization by Core Competencies

## Undersea Systems

- Autonomous Control and Intelligent Systems
- Systems Engineering and Analysis
- Energy Science and Power Systems
- Acoustics

## Communication and Information

- Information Science and Technology
- Multisensor Processing
- Navigation Research and Development Center

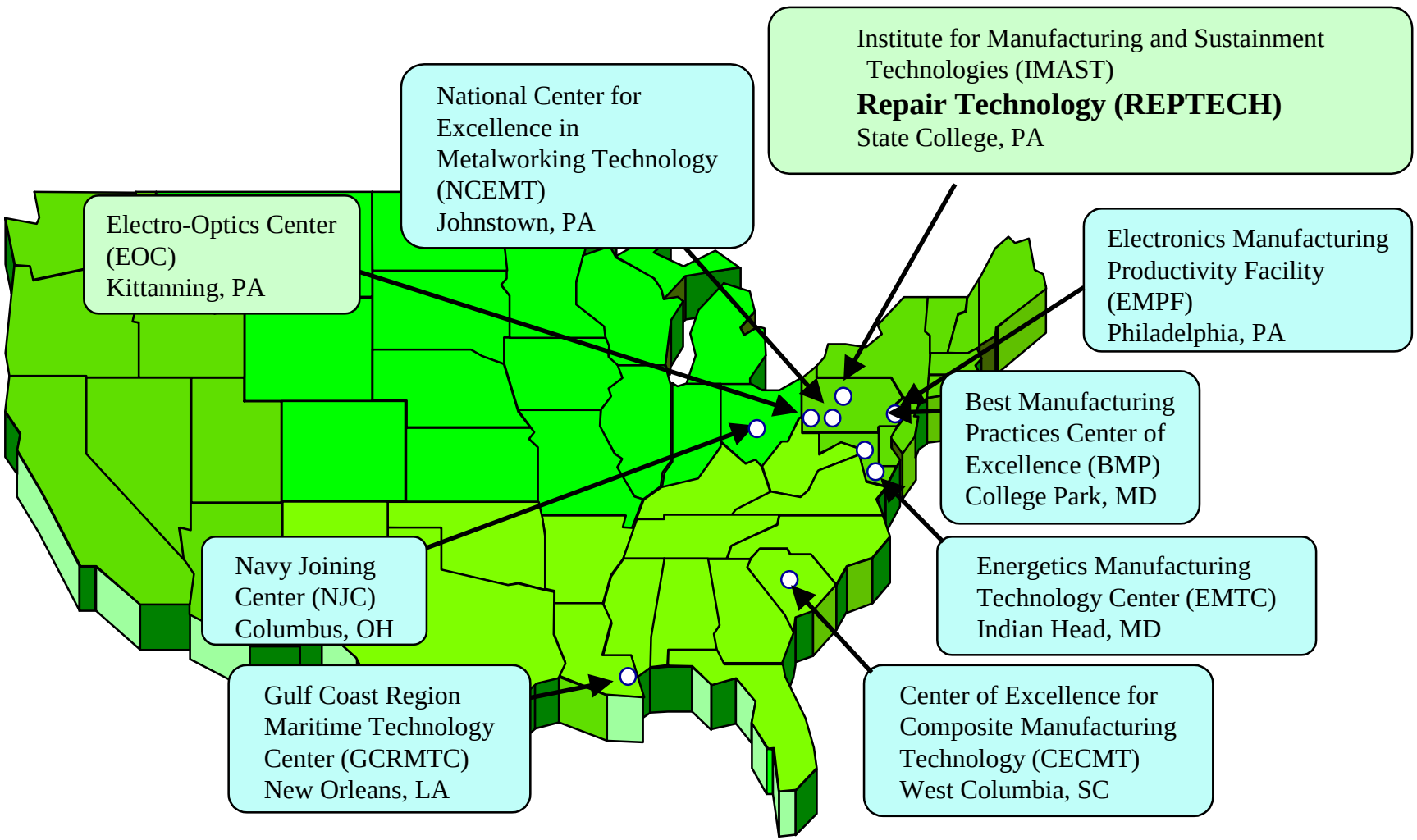
## Submarine and Ship Technology

- Engineering Mechanics
- Flow and Structural Acoustics
- Computational Mechanics Department
- Water Tunnel Operations

## Materials and Manufacturing

- Manufacturing Systems
- Materials Processing
- Laser Processing
- Composites

# ONR MANTECH "Centers of Excellence"

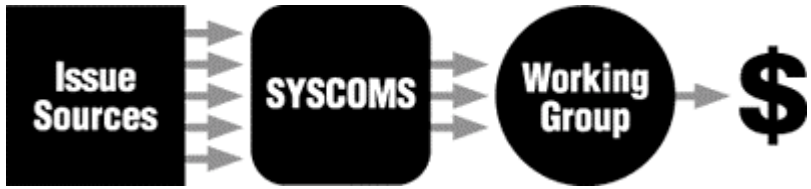


REPTECH

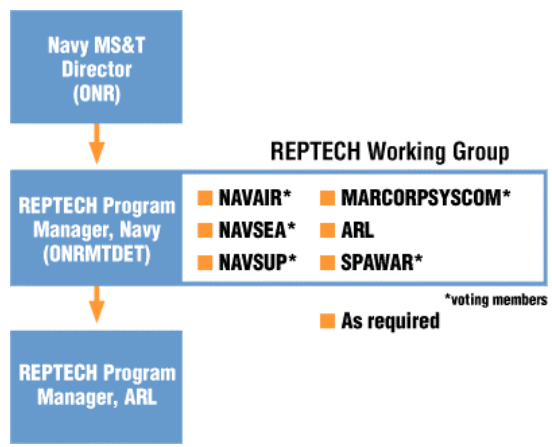
# Repair Technology Scope

- **Addresses -** Repair, overhaul, and sustainment functions
- **Emphasis -** Re-manufacturing processes and advancing technology.
- **Target -** Fielded Navy & Marine Corps weapon systems
- **Provide -** Process and equipment technology needed to repair and maintain fleet assets.
- **Implementation target -** Naval depots, shipyards, logistics bases and contractor facilities responsible for overhaul and maintenance of fleet hardware.

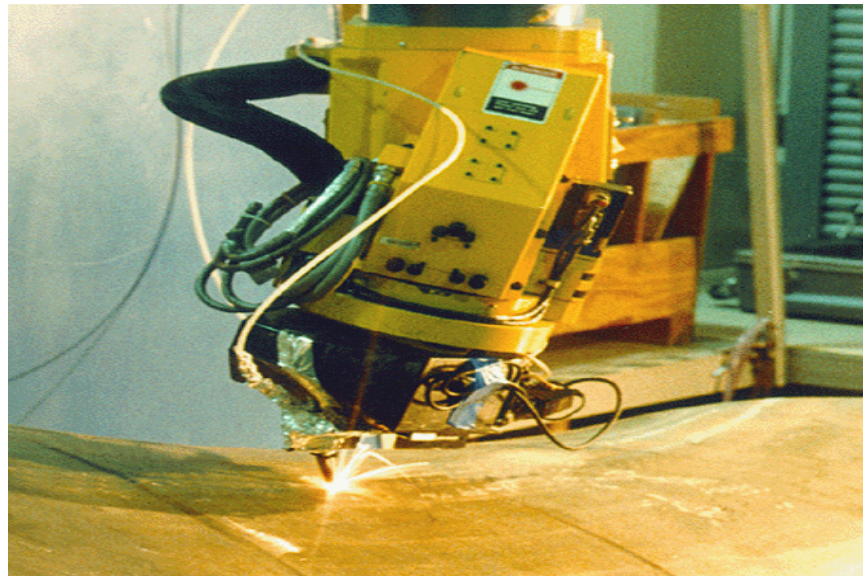
# REPTECH Process

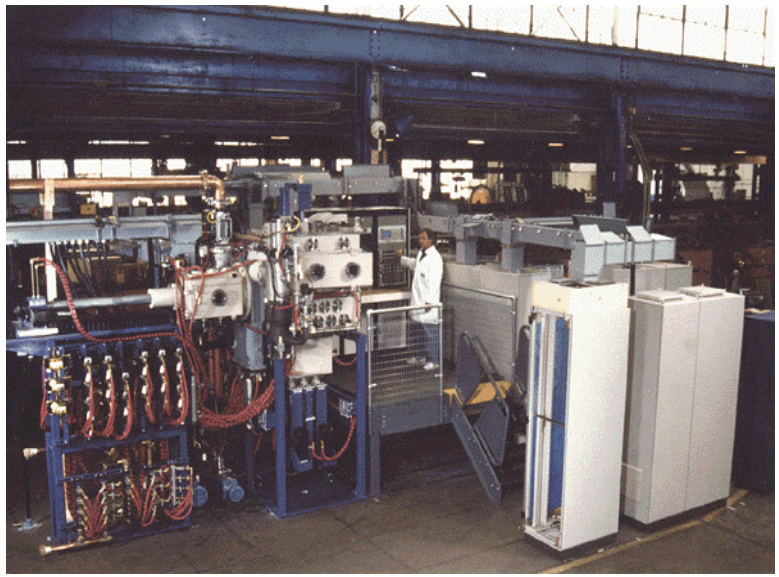


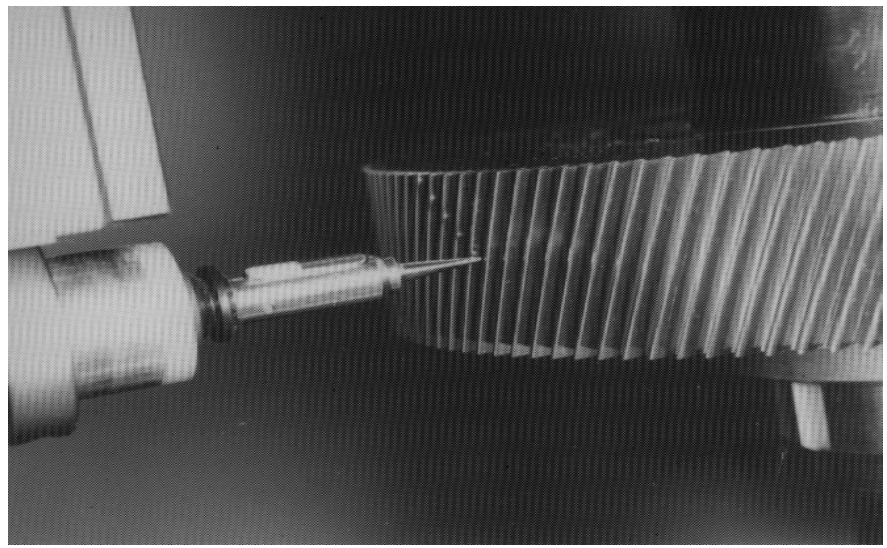

- Collect REPTECH issues from variety of sources
- Submit issue to database (https://mantech.pti.com/issues/)
- Individual SYSCOMs perform initial screening
- Brief issues to the REPTECH Working Group semiannually (Feb & July)
- Approval/Denial of projects for funding
- Execution begins in Oct



# REPTECH Provides







# Pre-, Projects & Rapid Responses

- Pre-Project Planning
  - › Funding allocated to define, determine, and submit the issue including initial research and travel time.

- Projects
  - › Duration 6 months - 3 years: Definition through Solution Implementation
  - › Cost guidelines: $100K<X<$1.0M total
  - › Deliverable: Solutions - including hardware, training, technical support, follow-up, Reports, Studies, etc.

- Rapid Responses
  - › Immediate impact concern
  - › Funding level of $50K or less
  - › Duration of 4 Months or less
  - › Deliverable: Solution

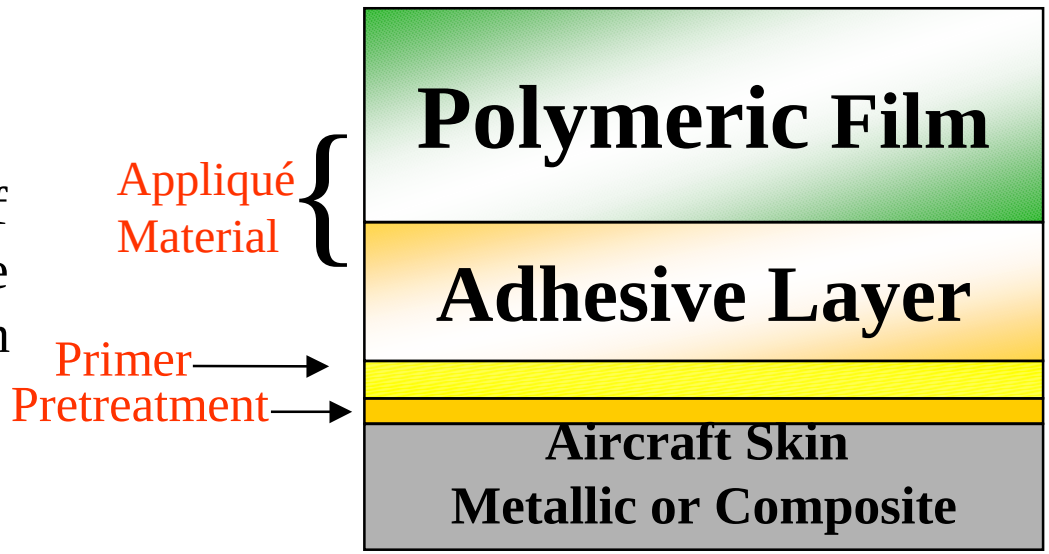
# Current Customer List

- MARCORSYSCOM
- Marine Corps Logistics Base Albany
- Marine Corps Logistics Base Barstow
- NAVAIRSYSCOM
- NADEP Cherry Point
- NADEP Jacksonville
- NADEP North Island
- NUWC Division Keyport
- SPAWAR Systems Center, San Diego
- Puget Sound Naval Shipyard
- Portsmouth Naval Shipyard

# FY01 REPTECH Projects

• **Acoustic Tile Removal** - Develop a cost-effective Heat Induction method for removal of paints and coatings from decommissioned submarines. Particular consideration for coatings containing PCBs, regarding off-gassing.

• **Aircraft Applique** - Develop improved methods of application and removal of the Paint Applique coating system on Navy aircraft




• **Air Treatment System improvement** - Determine the mass balance Volatile Organic Compound (VOC) removal efficiency and regeneration performance of Barstow MC Base air treatment system. Develop plan to modify system for federal & California emission compliance.

REPTECH

# FY01 Projects

• Evaluation and repair of LAV Armor - Analyze LAV high hardness armor plate cracking and subsequent ballistic windows created from field weld repairs. Determine feasibility of Laser Cladding weld repair to eliminate ballistic window.

• Hazardous and Wastewater Solids Recycling - Reduction/Elimination of hazardous waste stream integrated at a depot and implementation of recycling solid wastes.

• Heavy Equipment Repair - Age related deterioration project to identify cost drivers which impact sustainment of Marine Corps Support equipment.

# FY01 Projects

- Laser Cladding as Alt. To Cr Plating - Elimination of Chromium Plating by using cost-effective Laser Cladding repair.

- Liquid Phase Sintering (LPS) Repair - Elimination of Chromium plating by using cost-effective LPS repair technique on specific Marine Corps components.

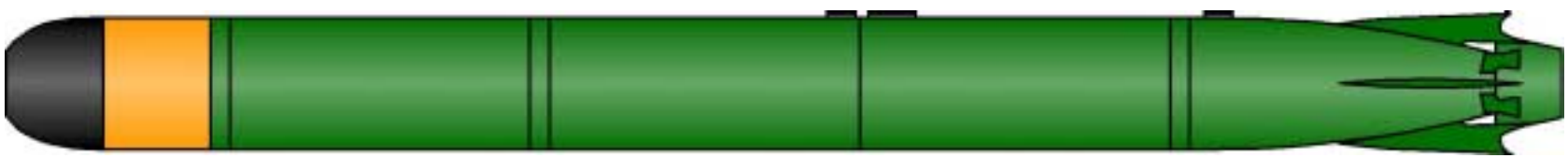
- Submarine Vertical Launch System (VLS) Repair - Replace costly electroplating process of removing corrosion from Submarine VLS tubes using In-Situ Laser Cladding

# FY01 REPTECH Projects

• Surface Preparation Improvement - Identify, develop and implement new and improved non-skid coatings removal and application technologies process. Specific concentration of surface preparations process prior to coating.

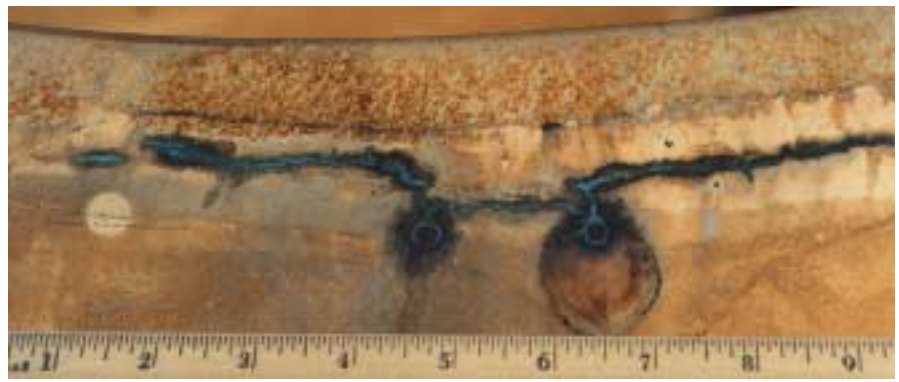
• Catapult Trough Cover Repair - Develop, test, and implement a production laser cladding repair process at PSNSY to refurbish Aircraft Carrier Catapult Systems

• Torpedo Repair - Develop, test, and implement a Laser stripping and cladding of Aluminum torpedo shells and various components.



# FY01 REPTECH Rapid Responses

• Submarine Fleet Problem Assessment - Determine the sources of cracking concerns of submarine propellers.



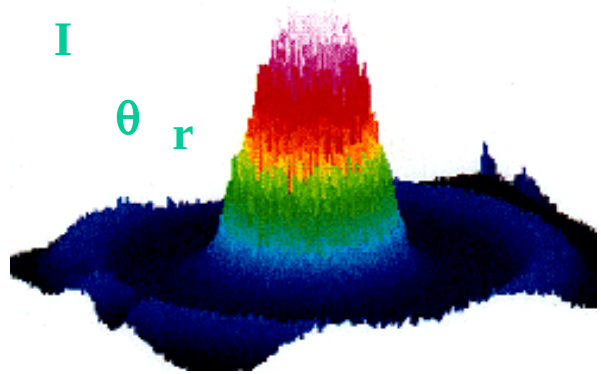
• LCAC Hover Craft Rotor Repair - Understand the scope and breadth of blade coating erosion/repair problem and develop possible remedies and future procedures.

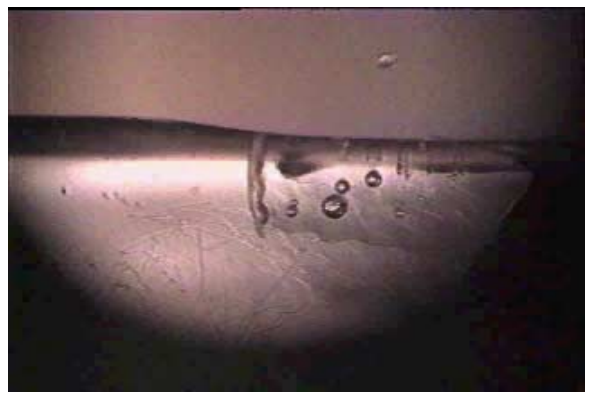
• H-53 Tachometer Gear Laser Clad Repair - Develop, cost-effective Laser Clad procedure to repair high cost, difficult to obtain Tachometer gears for H-53 aircraft.

• AV8B Harrier F404 Engine Bearing No. 3 - Analyze current diagnostic procedure in determining failures of No. 3 bearings in F402 aircraft engines.

# Program Improvements

- Up-front Involvement
- Approved Project Plans prior to execution
  - TA/Stakeholder
  - SYSCOM Rep
  - ONR Program Officer
- Project emphasis on:
  - Return on Investment (ROI)
  - Implementation
  - Follow-on support
- Industry Hand-off (NCMS CTMA)
- Customer Surveys



Experimental verification of the above model using laser welding of ice

# Reference Information: Websites

- ARL REPTECH
  - http://www.arl.psu.edu/areas/reptech/reptech.html
- Navy MANTECH issues
  - http://mantech.pti.com/issues
- Navy MANTECH Program
  - http://mantech.pti.com
- DoD MANTECH
  - http://www.dodmantech.com/

# Summary

- The ARL PSU REPTECH Program is tasked with inserting new technology ideas and processes to solve Navy manufacturing repair issues

- The current Navy infrastructure has several Repair issues to be addressed (more than funding allows, unfortunately)

- ARL REPTECH Program is dedicated to improve the Navy's organic depot capabilities.

- Thank You